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This table shows that of the fourteen species occurring in the Lower Silurian of Scotland but one half that number are represented in the American Ordovician, the other seven species appearing in the American Silurian. As most of these species occur in the last member of the Lower Silurian, the Carodoc, it is probable that this formation forms the transition zone between the Ordovician, as we know it, and the Silurian.

The Upper Silurian series is divided into the Llandovery, the Tarannon, the Wenlock, the Ludlow, and the Downtonian. These formations consist of mudstones, limestones, grits, graywackes, and conglomerates. The Downtonian which hitherto has not been recognized as a part of the Silurian is probably the equivalent of the Waterlime formation of our own country. It contains a fauna consisting of Ostracoids, Eurypterids, and fishes similar to the fauna of the Waterlime formation. This formation immediately underlies the Old Red Sandstone.

The economic products of the Silurian formations are lead, iron, copper, antimony, manganese, zinc, mispickel, silver, and gold, besides building materials, road-metal, and hone-stones.

Other chapters in the book are devoted to contact-metamorphism, and to the granites and associated igneous rocks.

W. N. LOGAN.

Genesis of Worlds. By J. H. HOBART BENNETT. Springfield, Ill.: H. W. Rokker, printer, 1900. Pp. 345.

This work does not need serious review from the point of view of science. It is the product of a mind deeply interested in the problems of cosmogony and apparently ready to accept the demonstrations of science, but yet still under the dominance of the traditional anthrophic mode of thought. It betrays throughout a serious lack of firm grounding in the elements of the sciences involved in the subjects under discussion, a grounding absolutely necessary to their successful treatment. The mode and style of the book may be illustrated by the following quotation from page 3:

> Inquiring minds have a propensity for tracing things to a first cause, and would ask from whence came the great nebula. It could not have sprung into existence already formed. It had an origin which is worthy of a most careful investigation, for it is one of a class that is represented by thousands

> of similar bodies in the heavens. May not a conjecture of its antecedents be properly presented here? It is that when the great Creator would form a new system of worlds, having allotted a district of suitable form and dimensions for the purpose, he changes the primordial matter in it from a gaseous condition, in which it had been under the law of repulsion, into cosmical dust, by which slight change it became subject to the law of gravitation.

And the following from pages 72 and 73:

> Any matter erupted from the sun can return to it again, as it does constantly from its prominences. But there seems to be a repulsion between all comets and the sun. They are attracted toward it, but never to it. After one revolution the reason may be given that they have established orbits. But that reason does not apply to the first approach. Any other bodies gravitating toward the sun from the depths of space would fall directly upon it. But cometary matter seems to be governed by an unknown law, a law of gravitation limited. There is attraction at a great distance, but repulsion on near approach. Is it not evident from the following quotation? "The great comet of 1843 passed within three or four minutes of the surface of the sun, and therefore directly through the midst of the corona. At the time of nearest approach, its velocity was three hundred and fifty miles a second, and it went with nearly this velocity through at least three hundred thousand miles of corona, coming out without having suffered any visible damage or retardation" (NEWCOMB'S *Popular Astronomy*, p. 251).
>
> Was not that a clear case of mutual shrinkage or gathering of skirts as two persons would gather their delicate robes to avoid contact when passing too near each other?

Occasionally the style falls off to this:

> This hypothesis presents, in a greater degree than any explanation heretofore offered, the elements of possibilities in the tissue of forces and their observed effects. Indeed those effects demand a reasonable exposition of producing causes.

The author attempts to solve some of the fundamental problems of geology by giving enormous magnitude to the rendering and triturating effects of the descent of the waters of the supposed primitive vaporous atmosphere upon the assumed hot earth. Respecting this he says:

> The inquiry must arise in every thoughtful mind, to what depth will the breaking of the rocky crust extend? What can arrest the destructive action of the water? Will the weight of the débris affect it at the depth of one mile, or two miles, or three miles? No, nothing can resist the explosive power of steam. It opens the way and keeps it open for the

> downward progress of water. Nothing can arrest the destruction of the rocky crust so long as there is rock to be broken. The entire solid crust of the earth must be transformed, must be rent into fragments. The water reaches the molten mass below and can go no farther. . . . .
>
> Again the phenomenal changes and the condition of the earth's crust embarrass our powers of description, and even conception. The water having reached the molten mass below the fragmental crust, could go no farther. It had reduced the temperature of the upper surface more nearly to that of boiling water, while that of the molten mass below the broken crust was nearly forty-four hundred degrees higher. The entire mass, thirteen miles in depth of débris and water, is kept in violent motion by the resistless power of steam over the entire surface of the globe.

On this "true basis," in negligence of the most obvious limitations of a well-recognized action, the author builds theories of elevation, vulcanism and stratification, and assumes that he has solved some of the great problems of geology.

Those who are not well versed in what is established will read the book at much risk of mixing needless error with truth, while those who are so versed will probably find it interesting chiefly as a psychological study.

The book is pervaded by an ostentatious piety of the type prevalent in the last century, which is liable to produce a moral effect quite opposite to that intended. True reverence is best displayed by refraining from presuming to know the mind and purpose of the Infinite and by scrupulously dissociating one's imperfect notions from all connection with Omniscience. T. C. C.

Text-Book of Paleontology, by KARL A. VON ZITTEL, translated and edited by CHARLES R. EASTMAN. Vol. I, Part II, pp. 353–706, with 883 wood-cuts. Macmillan & Co., 1899.

After an interval of more than three years since the appearance of Part I, the invertebrate portion of Zittel's Paleontology is at last brought to a conclusion. The plan and scope of this work was discussed at length in a review of Part I, which appeared in this JOURNAL for October 1896; hence it is only necessary to repeat here that the English edition is a composite production, much of Zittel's text being discarded and replaced by original contributions from a dozen different authors, whose names are given on the title-page.